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**The Use of Geographical Information in
Retail Locational Decision-Making**

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Biography

John Byrom is a Research Assistant within the Locational Planning and Marketing Group, Department of Retailing and Marketing at the Manchester Metropolitan University. He is undertaking a PhD on a part-time basis entitled 'The use of Geographic Information by retail organisations within locational decision-making activity'. His additional research interests are in the fields of loyalty card schemes, retailing in rural areas, and the training needs of independent retailers.

Abstract

This paper discusses an on-going programme of research that investigates the use of Geographical Information (GI) in retail locational decision-making. The continued pressures facing UK multiple retail organisations are such that decisions regarding the location of outlets are of significant importance. These locations represent sites where significant amounts of retail capital are 'sunk'. Once taken, decisions regarding the location of outlets cannot be easily altered. In order to assess the current role and use of GI in locational decision-making a three-stage approach has been adopted and is reported here. First, exploratory research was undertaken to assess decision-makers' use and awareness of the geographic nature of one particular type of GI. Secondly, a detailed postal survey was distributed to those responsible for locational decisions. This recorded a 36 per cent response rate and is the main focus of this paper. Thirdly, detailed case study research is proposed in three multiple retail organisations. It is envisaged that the results thus generated will provide a richer understanding of the nuances of retail locational decision-making.

Keywords

Retail location, Geographic information, Data sources, Retail locational planning, UK.

1. Retail Location in the UK and the (Potential) Role of Geographic Information: an Overview

The role and function of location departments within a number of retail organisations has increased significantly in the recent past. The lack of seemingly ‘obvious’ sites for retail development, coupled with heightened competition in a number of sectors of retailing has in part facilitated a drive by retailers to maximise returns from their locations, where large amounts of retail capital are ‘sunk’ (Wrigley, 1992; Guy, 1997). The impact of government legislation has also been keenly felt in certain sectors of retailing, most noticeably with the 1996 revision of Planning Policy Guidance Note 6 (PPG 6) which has sought to discourage retail developments away from town centre or edge-of-centre sites (Department of the Environment, 1996; Wrigley, 1998). Against this backdrop, there is also especial concern that saturation is a very real prospect in a number of sectors of retailing, most noticeably grocery retailing (Guy, 1994; 1996; *The Grocer*, 1997; Langston *et al.*, 1997; 1998).

Given the perceived importance of location to retail organisations nowadays, the present programme of research seeks to assess the use of Geographic Information (GI) in retail locational planning. GI, which is also known as geographic data, geospatial information or spatial data (Department of the Environment, Transport and the Regions, 1998) has become a noted resource in many environmental and business applications since Lord Chorley’s government report of 1987 (Department of the Environment, 1987) highlighted its significance. It is commonly defined as ‘information which can be related to specific locations on the Earth’ (*ibid.*, page 7). Following the publication of this report the benefits of GI became more widely recognised, especially following the 1989 establishment of the Association for Geographic Information (AGI), the independent industry body and pressure group which promotes GI. Allied with an increase in GI awareness in commerce¹, was the gradual introduction and diffusion of Geographic Information Systems (GIS)²,

¹ Although it should be noted that this awareness is by no means widespread either within or between various sectors of the economy.

² A common definition of GIS is ‘a powerful set of tools for collecting, storing, retrieving at will, transforming and displaying spatial data from the real world’ (Burrough, 1986, page 6).

initially in local government (Campbell and Masser, 1995) and later diffusing into industry (Grimshaw, 1994; Longley and Clarke, 1995; Birkin *et al.*, 1996). Such systems allow the presentation and overlay of various types of data, most commonly in a map format. It is the 'systems' side of Geographic Information *Science* that appears to have been the principal focus of the majority of research in the last decade in a commercial context, rather than the 'information' side.

In a retailing context, some research has concentrated on the use and diffusion of GIS, most noticeably in locational planning departments (Clarke and Clarke, 1995; Hernández, 1998). A further focus of GI-related research in retailing and services has been geodemographics, which are 'the analysis of social and economic data in a geographical context for commercial purposes related to marketing, site selection, advertising, and sales forecasting' (Goodchild, 2000, page 297). A number of commercial companies now provide such systems, including Experian who offer the 'MOSAIC' system. This classes every postcode in the UK into one of 12 groups and 54 types, each with suitably descriptive titles such as 'Lowland Agri-Business', 'Stylish Singles', and 'Corporate Careerists'. The applicability of geodemographics to retail locational planning can be seen through their ability to, *inter alia*, determine the customer make-up of a potential store's catchment area which can tie in directly with the particular offering proposed by a given retailer (Sleight and Leventhal, 1989; Batey and Brown, 1995; Birkin, 1995; Sleight, 1997). It should be noted, however, that geodemographics are by no means the only type of GI that exist, indeed it has been estimated that some 90 per cent of all commercial data are geographic in nature (Moloney *et al.*, 1993). Despite the prevalence of GI in a business and retail setting, little, if any, research has gone further than either describing the use of one particular source (Baron and Lock, 1995; O'Malley *et al.*, 1995, 1997) or auditing the sources of data available to retail decision-makers (Hernández *et al.*, 1995).

Turning now to consider locational decision-making in retailing, it has become increasingly evident from the literature that the traditional neglect of 'place' as one of marketing's so-called '4 Ps' (McGoldrick, 1990) is most definitely being addressed. The sectoral movement of retailing to out-of-town sites in 'waves' has for instance been subject to consideration and conceptualisation (Schiller, 1986;

Fernie, 1995). At a micro scale, the impact and role of location within relatively small locales such as town and city centres has also been considered (Brown, 1987; 1992). In terms of locational planning by multiple retailers, the time-honoured reliance on retailers' expansion strategies has been challenged by research that highlighted the importance of other location decisions to retail companies (Clarke *et al.*, 1997). The so-called '6 Rs of the location mix' illustrate this and are shown in Table 1.

Table 1: The 6 Rs of the location mix (after Hernández *et al.*, 1998)

Type of Decision	Description
Roll-out	Increasing floorspace in existing store or opening a new store
Relocation	Moving to a new site due to close proximity of two stores, or availability of a new retail pitch
Rationalisation	Closure of individual stores, or selling of divisions
Refascia	Altering image of outlets by changing their name/appearance
Refurbishment	Updating fittings
Remerchandising	Altering product range of a retail location, tailoring offer to the local consumer

Whilst increasing sophistication is becoming apparent in locational decision-making, in part due to the decreased cost and increased availability of relevant technologies such as GIS (Clarke and Rowley, 1995; Clarkson *et al.*, 1996) and increased recognition of the financial significance of locations (Wrigley, 1992), it is also obvious that 'finger in the air' and 'gut feel' methods of retail location planning are still prevalent. Hernández and Bennison (2000) for instance postulate that there exists an 'art and science' of retail location decisions but that 'the 'retail nose' may remain the ultimate arbiter' (*ibid.*, page 365) with respect to locational planning. Subjective and intuitive methods of decision-making are still extremely commonplace in a retail locational context (*ibid.*).

In order to assess the use of GI in retail locational planning, three specific aims of this programme of research are envisaged, *viz.*:

1. To ascertain the relationship between GI and retail organisations' locational decision-making activity.
2. To establish the nature and extent of GI collection by UK multiple retailers, and

to evaluate its use within decision-making activity

3. To determine the role of spatial cognition with respect to the use of GI within locational decision-making behaviour, and to represent this through a conceptual framework.

This paper is structured as follows: the next section details the methodology employed in the research programme so far with a description of the interviewing and survey procedures that have been utilised. Following this, preliminary results are discussed prior to some conclusions and implications for the future progression of this research.

2. Methodology

The first stage of the research involved exploratory research into the use of one particular dataset, namely that containing loyalty card data. Loyalty card schemes have risen in prominence in the last few years and typically involve the customer building up points through the medium of a plastic-swipe loyalty card. Detailed data are generated on customer sales and patterns that can be referenced to the individual cardholder's address. This locational fixing of loyalty card data allows any data that are generated to be considered as a particular type of GI. A series of semi-structured interviews within five multiple retailers was therefore carried out which investigated the use and geographical awareness of such data.

The next stage of the research involved the implementation of a large-scale postal questionnaire survey. This was in order to establish the nature and extent of GI collection by location departments, and to also consider the relationship between GI use and retail organisations' locational decision-making activity. Entitled the '1999 Survey of Data Use in Locational Planning', the survey had a broader remit than the consideration of GI alone as it incorporated questions on the use of data and information in general, as well as current locational practices within UK retail organisations.

Pre-testing of the initial survey was carried out amongst locational planning

managers, academics and consultants, amounting to some 12 in total. This allowed certain minor changes to be made, although it should be noted that the overall layout, structure and content of the revised survey varied little from the original. The questionnaire was targeted at those retailers operating over 50 outlets. A number of retailers with fewer stores were also included, where such retailers could be seen to have a strong regional catchment. Sampling was of the judgemental type (Hague and Harris, 1993) and commercially available retail directories were used to construct the sample (Newman Publishing, 1999; William Reed Publishing, 1997). In total, 289 questionnaires were distributed to individuals responsible for store location planning with names being gathered via a prior telephone call. This enabled questionnaires to be posted to a named individual, thereby potentially increasing the response rate (Hegelson, 1994).

The questionnaire was presented in an attractively designed 12 page-format on pale cream paper. A covering letter was also included emphasising the academic nature of the study, a promise of confidentiality and the provision of free summary findings to respondents, all established research strategies for inducing responses (Jobber and O'Reilly, 1996; Turley, 1999). A return envelope was included as the presence of this has been proven to increase response rate (Clark and Kaminski, 1990). The questionnaire contained a mixture of closed and open-ended questions. A follow-up letter was delivered to those individuals who had not replied after approximately 3 weeks. This had the effect of increasing the response rate to the survey by some 16 per cent. Analysis of the responses was carried out using the Statistical Package for the Social Sciences (SPSS) where appropriate (McCormack and Hill, 1997) and basic content-type analysis (Hague, 1994). In total, some 104 respondents returned the questionnaire completed, a response rate of 36 per cent, greater than Saunders *et al.*'s (2000) marker of 30 per cent as a 'good' response through this medium. In addition, a further 11 per cent of respondents refused to take part in the research for reasons such as time pressures and commercial sensitivity.

3. Preliminary results

This section reports the result of the research carried out to date. From the

exploratory interviews that were conducted to investigate decision-makers' geographical usage and awareness of loyalty card data, it was apparent that few interviewees considered the data that they held to be geographic in nature. Generally, little mapping of customer patterns was undertaken and data were mostly used, if at all, to refine the targeting of direct mail. Fuller results from this stage of the research are available in Byrom *et al.* (2000). From this stage of the research, however, it was possible to surmise that despite virtually all loyalty card data being geographic in nature, there was little evidence to suggest that this dimension to the data was apparent in any analysis that was undertaken of the database.

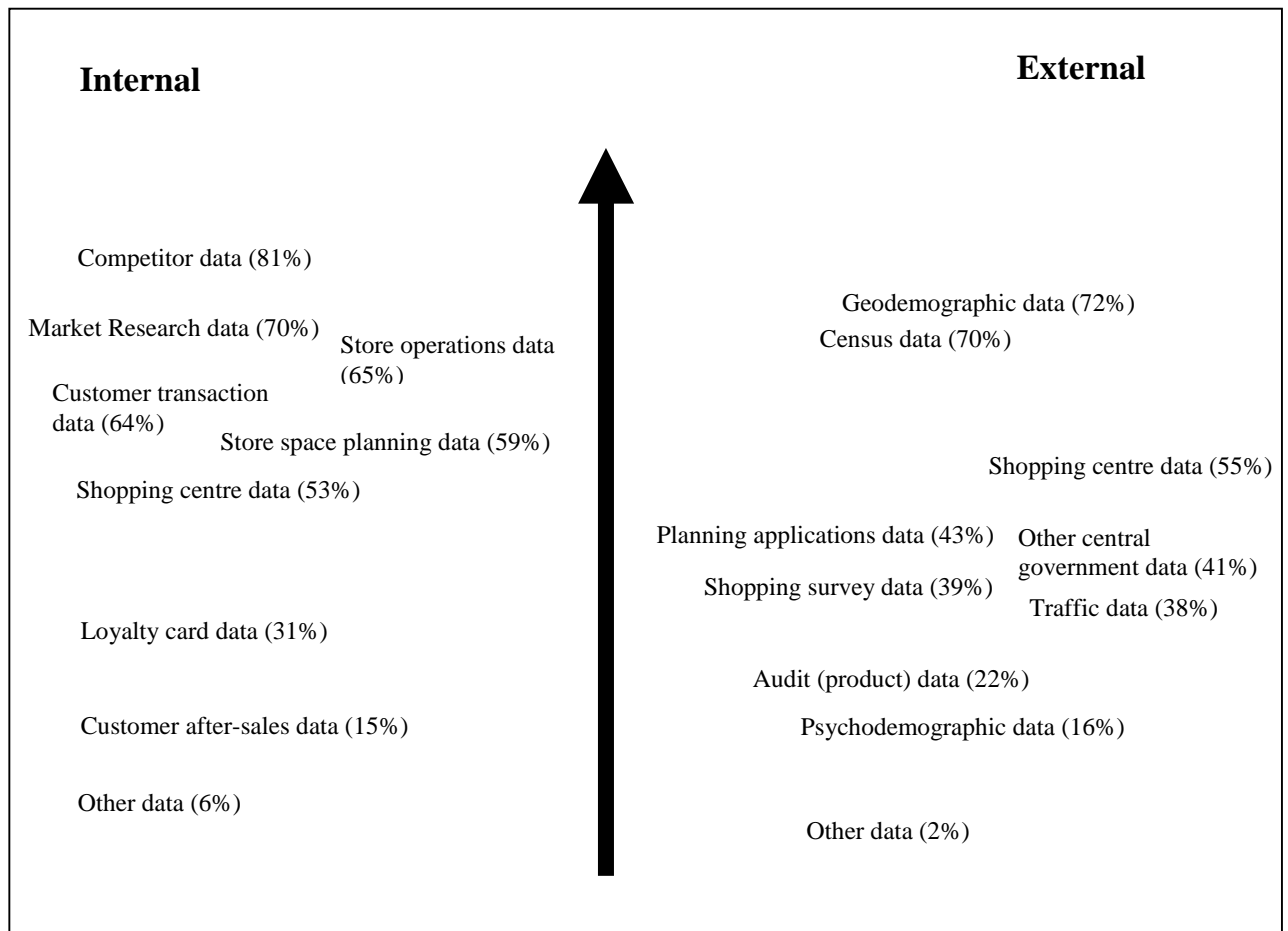
A wide range of results was forthcoming from the questionnaire survey and preliminary findings are presented here. The 36 per cent of usable responses represented organisations that were responsible for the operation of some 49000 outlets, and the breakdown by number of outlets operated is given in Table 2. Respondents were drawn from virtually all sectors of retailing.

Table 2: Survey sample by number of outlets operated

No. of outlets	50 or less	51-100	101-250	251-500	501-1000	1001-2500	Over 2500
% of sample	5	13	37	21	13	8	3

Almost all respondents (95 per cent) collected data, with the average number of datasets collected being 10. Figure 1 shows the percentage of respondents collecting named datasets.

Figure 1: Percentage of respondents collecting named datasets



As can be seen, a number of datasets with common features are more frequently collected. Census data, geodemographic data and lifestyle data were all sourced from external sources by approximately two-thirds of respondents. In terms of data collected from within the organisation, competitor, transactional and operational data predominated. Some 86 per cent of respondents said that data were shared within the company, with 6 datasets on average being shared. Table 3 shows which datasets were shared most frequently, as a proportion of those respondents collecting the specified dataset. Internal datasets are more likely to be shared than external datasets. This may be due to the existence of dedicated systems for sharing internal data.

Table 3: Percentage of respondents sharing named datasets

Internal datasets		External datasets	
<i>Dataset</i>	<i>% of respondents</i>	<i>Dataset</i>	<i>% of respondents</i>
Loyalty card	88	Census	61
Customer after sales	88	Geodemographic	61
Market research	84	Shopping survey	59
Store operations	76	Planning applications	56
Customer transaction	75	Lifestyle	51
Store space planning	72	Background map	49
Competitor	68	Shopping centre	47
Shopping centre	45	Traffic	46
		Central government	40
		Audit	30

Access to data was a major issue with respect to respondents' priorities for improved data and information, with the availability of data on the Internet or Intranet or in a central data warehouse cited as being a significant requirement. The importance of educating personnel as to the benefits of using data was also mentioned with the following quotes illustrating this:

'We are not aware of what data and information is available. We need to know more.'

'Better education of other departments as to what's available is needed along with better software delivery systems i.e. internet/intranet mapping packages.'

'Improved lines of communication between all departments would be good.'

Of those sharing data, 57 per cent shared data with a single department more than any other. Reflecting the common linkages between locational planning and marketing and operations departments, Table 4 highlights the fact that these two latter departments were most frequently involved in data sharing.

Table 4: Department that data were most commonly shared with

Department	% of respondents sharing data principally with that department
Operations	34
Marketing	30
Merchandising/ Buying	7
Sales	3
Other	26

Attitudinal statements were also a feature of the survey and there was evidence from these that GIS were becoming a central part of locational decision-making (see Box 1). It was also apparent that respondents had experienced an increase in available data, with roughly three-quarters of respondents agreeing that the amount of data available to them had increased significantly in the last 5 years, yet most respondents disagreed with the statement that *too much* data were available.

The main focus of the survey was to analyse the role of geographic data and information in locational decision-making. To date, little research has focused on practitioners' awareness of the geographic nature of data and resultant analysis that is possible. As noted earlier, it has been estimated that 90 per cent of all commercial data can be considered geographic in nature (Moloney *et al.*, 1993). For purposes of clarification and to avoid confusion over the term 'geographic data', a commonly accepted definition was given within the questionnaire. Wildly different responses, ranging from 0 per cent to 100 per cent were given by respondents when they were asked what proportion of their departments' internal databases were geographic. The average figure given was 47 per cent. Reflecting differences between respondents' 'geographical awareness', Table 5 shows that GIS implementers placed a higher value on the amount of their data that they thought to be geographic than non-GIS implementers.

Box 1: Attitudinal statements – organisational aspects of data

Statement	% of respondents		
	Agree	Neither	Disagree
‘GIS are a vital part of our department’s decision-making processes’	45%	25%	30%
‘The amount of data at our disposal has not increased significantly in the last 5 years’	21%	5%	74%
‘It often seems that we have too much data for our requirements’	18%	29%	53%

Table 5: Respondents deeming % of data geographic by GIS implementation

GIS status	% of respondents’ internal datasets deemed geographic			
	<i>0-24</i>	<i>25-49</i>	<i>50-74</i>	<i>75-100</i>
GIS implemented	10	8	10	22
GIS not implemented	24	6	6	14

Some 85 per cent of respondents thought that the geographic referencing to data was either ‘very important’ or ‘quite important’ to their company, suggesting that practitioners could see the value in knowing and applying the location of customers and outlets in space. In contrast to this, 47 per cent of respondents felt that they were not maximising their use of geographic data, whilst 22 per cent of respondents did not know if they were getting the most from this resource. Respondents felt that the use of geographic data could be improved in a number of ways, including:

‘having the time to spend studying the data,’

‘the greater use of customer data,’

‘knowing more about competitor locations/sizes so that strategy planning can be better performed.’

The attitudinal statements (see Box 2) also highlighted the fact that geographic data are an important resource to many locational planning executives. GIS had been

implemented in 46 per cent of companies. The implementation of GIS varied by sector, with approximately three-quarters of grocery respondents having implemented GIS in contrast with no respondents in the CTN, stationery and furniture sectors having introduced the technology. In terms of those respondents that had *not* implemented GIS, 60 per cent of respondents agreed with the statement ‘we can see some advantages in implementing GIS’, and others cited reasons for their non-introduction:

‘Funding is not available.’

‘At present we don’t have the resources or manpower to consider setting up a GIS system.’

‘(GIS are) not a priority at present.’

Box 2: Attitudinal statements - data issues			
Statement	% of respondents		
	Agree	Neither	Disagree
‘Geographic data are the key to many of our business requirements	68%	27%	5%
‘Geographic data are unlikely to increase in importance over the next 5 years’	27%	19%	54%
‘Awareness of the geographic element of data is prevalent across our department’	63%	19%	18%
‘Geographic data are no different from any other type of data’	20%	35%	45%

The apparent increase in the amount of technology available for store location decisions had resulted in more respondents holding datasets digitally – on average 56 per cent were held in this format. Respondents stated that on average 23 per cent of their digital datasets were held in a GIS. Table 6 shows which geographical scales were used most frequently by respondents, with postal codes and company specific areas (such as store catchments) being most predominant.

A further focus of the survey was locational decision-making practices and strategies. Most respondents (74 per cent) stated that the number of outlets operated had increased in the last 5 years. However some interesting inter-sectoral differences were apparent when respondents' views on how the number of outlets would change in the next 5 years were sought. Overall, 67 per cent of respondents thought that the number of outlets they operate would increase, but this average masks considerable inter-sectoral variations. Whilst three-quarters of grocery retailers thought their store networks would increase, just one of the financial sector respondents envisaged an increase in their branch networks.

Table 6: Percentage of respondents using specified geographical scales

Geographical Scale	% of respondents using specified scale
Wards/parishes	8
Local authority districts	21
Ordnance Survey grid references	19
Postal geography units	60
Company specific regions or areas	50
Census geography units	29
Travel to Work areas	14
Other geographical units	19

Respondents reported a fair degree of sophistication with regard to locational applications, such as targeting direct mail, monitoring outlet performance and catchment area identification; that were carried out. The average number of named applications undertaken on an *ad hoc* basis was 4 and the average number of named applications undertaken on a regular basis was 6. Respondents operating more outlets tended to carry out more applications, suggesting that larger store networks necessitate greater investment and sophistication in locational techniques and applications.

The attitudinal statements (see Box 3) also highlighted the importance of visits to sites, with 96 per cent of respondents agreeing that 'site visits were a vital part of locational decision-making processes'. This would suggest that despite rapid advances in the amount of technology available in recent years, intuition and a good retail 'nose' are still an essential part of locational decision-making.

‘Gut feel and experience has worked very well so far.’

‘Locational identification still works predominantly on hunches and intuition. GIS is helping but not as fully as possible.’

‘In my opinion, sound locational decision-making is an art not a science. Without an understanding of the strengths and weaknesses of the base data . . . geographic information and software is dangerous and costly witchcraft.’

Box 3: Attitudinal statements - locational decision-making

Statement	% of respondents		
	Agree	Neither	Disagree
‘Making visits to potential and existing outlets is a vital part of our locational decision-making processes’	96%	3%	1%
‘Our company is oriented towards decisions that are supported by statistical analysis’	57%	21%	22%
‘The recommendations our department makes are rarely accepted by senior management’	5%	10%	85%

Many respondents felt that their locational decision-making processes were constrained by internal politics and bureaucratic decision-making structures, insufficient resources and a lack of appropriate data and information for decision-making.

4. Conclusions and implications for further research

The research undertaken to date has gone some way in tackling the first two aims of the programme of research, namely to ‘ascertain the relationship between GI and retail organisations’ locational decision-making activity’ and ‘to establish the nature and extent of GI collection by UK multiple retailers, and to evaluate its use within decision-making activity’. The exploratory stages of the research established that one particular type of GI, loyalty card data, were generally not being utilised to their fullest extent. Recognition of the geographic nature of such data allows a fuller

picture of consumer behaviour to be established, including such details as where consumers are located and when and where they shop, through the large amounts of data that are gathered that are specific to the individual. This stage of the research suggested that further work that documented the nature of GI collection and use within locational decision-making activity would be apposite.

To that end, a large-scale postal survey was carried out which emphasised that there is relatively widespread collection and usage of data amongst respondents across various sectors. The geographic nature of data and information was not viewed as an explicit feature of the data. Some awareness of the importance of the geographic nature of data, correlated to the use of GIS, was, however, evident with some respondents; as was the importance of mapping locations. On the whole, a need for greater sharing of data within organisations to reduce unnecessary wastage and duplication was identified. The importance of new technology (for example the Internet and Intranet), greater communication, and awareness of what data are available are seen by respondents as central to an improvement in the use of data. Despite the introduction of new technologies, more 'traditional' methods of site analysis are still important and, as suggested by Hernández and Bennison (2000), it would appear that human judgement is still the 'ultimate arbiter'.

In terms of the future progression of the research, there is, of course, greater scope for investigation into the role of GI in locational decision-making. It is envisaged that this will be achieved through a series of telephone interviews with 57 of the 104 respondents who agreed to be further involved. This will allow a more detailed evaluation of the nature of GI use within locational decision-making activity to be achieved. Following these telephone interviews, in-depth case-study research will be undertaken in 3-4 multiple retail organisations. The purpose of these case studies is to tackle the third aim of the programme of the research, namely 'to determine the role of spatial cognition with respect to the use of GI within locational decision-making behaviour, and to represent this through a conceptual framework'. It is suggested here that individuals' varying cognitive processes will impact significantly on the use and visualisation of GI, thus affecting its use within locational decision-making activity. The use of cognitive mapping techniques, akin to those emanating from Lynch's seminal (1960) work *The Image of the City*, with

stakeholders in the locational decision-making process is therefore central to the next stages of this research.

In sum, it is expected that, once completed, the latter stages of this programme of research will enhance the body of research that has been concerned with retail locational decision-making. Spatial cognitive mapping techniques are yet to be evaluated fully in such a context, although some initial research has recently been undertaken by Clarke *et al.* (2000) who have used such techniques amongst retail executives to establish the key factors pertaining to successful superstores. It is envisaged that the further employment of cognitive mapping techniques will increase understanding of the dynamics of retail locational decision-making at a time when the certainty of retail locations is by no means guaranteed.

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